603-CD-004-001

EOSDIS Core System Project

Flight Operations Segment (FOS) Release B Operational Readiness Plan for the ECS Project

This document has not yet been approved by the Government for general use or distribution.

October 1997

Hughes Information Technology Systems
Upper Marlboro, Maryland

ECS FOS Operational Readiness Plan Release B for the ECS Project

October 1997

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APPROVED BY

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Preface

This document is a formal contract deliverable with an approval code 1. It requires Government review and approval prior to acceptance and use. Changes to this document also require Government approval prior to acceptance and use. Changes to this document shall be made by document change notice (DCN) or by complete revision.

Once approved, this document shall be under FOT Configuration Control. Any questions or proposed changes should be addressed to:

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Abstract

This ECS FOS Operational Readiness Plan Release B (DID 603/OP1) identifies and describes the activities for preparing, verifying, and reviewing the operational readiness of the ECS M&O staff, procedures, hardware, software, and databases. These activities include operations exercises, simulations, database validation, and training and certification.

Keywords: ECS Operational Readiness, operational, operations, readiness, M&O, Maintenance and Operations

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1. Introduction

1.1 Identification

This Operational Readiness Plan, CDRL item 111, whose requirements are specified in Data Item Description DID 603/OP1, is a required deliverable under the EOSDIS Core System (ECS) Contract (NAS5-60000).

1.2 Scope

The purpose of this document is to describe the activities for preparing, verifying, and reviewing the operational readiness of the ECS Flight Operations System (FOS), Flight Operations Team (FOT) staff, procedures, hardware, software, and databases. It covers the schedule period from FOT Release B Consent to Ship Review (CSR) through the point of declaring ECS ready for initial AM-1 operations.

1.3 Document Organization

Section 1 describes the structure and scope of the document, and the document organization.

Section 2 identifies the documentation from which this plan takes its authority, and to which the reader can refer for further information.

Section 3 identifies and describes the schedules and activities that must be accomplished to prepare the ECS FOS/FOT to be operationally ready for AM-1 mission events. These activities include operations exercises, simulations, database validation, and training and certification.

Section 4 contains the definitions for the acronyms used in this document.

Section 5 contains Attachment A - ECS FOT AM-1 Road-to-launch.

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2. Related Documentation

2.1 Parent Documentation

The parent document is the document from which the scope and contents of this ECS Release B Operational Readiness Plan is derived.

423-41-01	Goddard Space Flight Center, EOSDIS Core System (ECS) Statement of Work

2.2 Applicable Documentation

The following documents are referenced within this ECS Release A Operational Readiness Plan, or are directly applicable, or contain policies or other directive matters that are binding upon the contents of this volume:

603-DR-001-001	ECS Release A Operational Readiness Plan
360-TP-001-002	Flight Operations Segment (FOS) Commercial Off the Shelf (COTS) Hardware for Release B
DID 622/OP2	ECS FOS Release B Training Plan
DID 626/OP2	ECS FOS Release B Certification Plan

Earth Observing System (EOS) Spacecraft Simulation Plan

EOS PDB Command File Validation Plan

2.3 Information Documentation

The following documents, although not referenced herein and/or not directly applicable, amplify or clarify the information presented in this document. These documents are not binding on the content of the ECS Release B Operational readiness Plan.

OPD-010	EOS AM-1 Flight System Operations Manual
OPS-102	EOS AM-1 Spacecraft Flight Systems Plan
304-CD-001-001	FOS Requirements Specifications Vol. 1
609-CD-005-002	FOS Operations Tools Manual
OPD-100	EOS AM-1 Spacecraft Flight Systems Manual Vol. I-V Functional Requirements for EOSDIS

EOS Ground System Architecture Design Document

ECT-1 Debrief Report

ECT-2 Debrief Report

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3. ECS Release B Operational Readiness

3.1 Road-to-Launch

The Road-to-launch is a schedule that shows what is to be accomplished to prepare for the AM-1 launch and mission operations. In addition the schedule also shows the interdependencies between activities and between activities and external entities. The ECS FOT AM-1 Road-to-launch Plan in not an ECS CDRL item, it is a "living document" that is subject to change. Attachment A to this document is the current ECS FOT AM-1 Road-to-launch.

ID	Task Description	Start	Finish	Sub Project
1	**1 FOT Tasks**	**1/2/95**	**3/15/99**	**No**
2	1.1 ECS FOT Technical Development	1/2/95	3/15/99	Yes
3	1.2 Support FOS	1/2/95	1/2/95	No
4	1.3 Testing	10/8/96	5/15/98	Yes
5	**1.4 Develop Draft SOP's**	**3/3/97**	**3/10/98**	**No**
14	**1.5 Populate the Project Database**	**1/1/97**	**12/10/97**	**No**
41	**1.6 Develop Analysis Tools**	**9/3/97**	**12/11/97**	**No**
42	1.6.1 Train on FOS Analysis Tools	9/3/97	9/4/97	No
43	1.6.2 ID Critical tlm	10/29/97	10/30/97	No
44	1.6.3 Compose Derived Parameters	10/30/97	12/11/97	No
45	**1.7 Train FOT**	**10/6/97**	**2/23/98**	**No**
46	1.7.1 Train FOT on FOS	10/6/97	2/5/98	Yes
47	1.7.2 Train FOT on AM-1 Operations	1/15/98	2/23/98	Yes
48	1.8 Flight Operations Reviews	9/15/97	6/23/98	Yes
49	1.9 Prepare for Launch	3/18/98	7/1/98	Yes
50	**1.10 Launch**	**6/30/98**	**7/1/98**	**No**
51	1.11 Post Launch Verification	8/5/97	2/9/99	Yes
52	2 External Elements	1/2/95	1/3/95	No

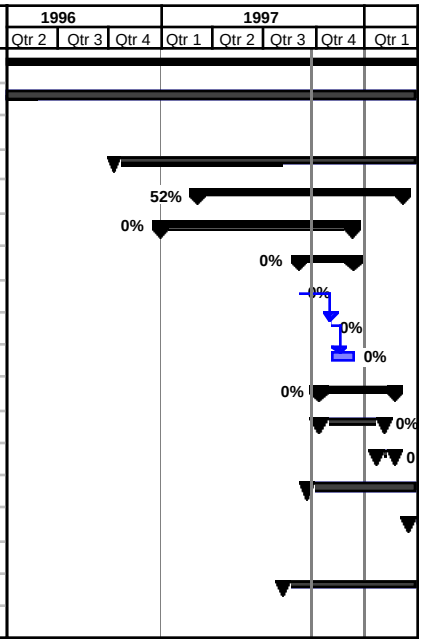

Figure 3.1. AM-1 Road-to-Launch Example

3.2 Training and Certification

The ECS Release B Training and Certification requirements are detailed in the FOS Release B Training and Certification Plan (DID 622/OP2 & DID 626/OP2). This plan defines training requirements as it relates to the operations and maintenance of ECS FOS Release B by the FOT. The scope of this plan includes the FOT Training processes and policies and is limited to the FOS Release B software and hardware design for supporting AM-1 mission operations. Training on management and personal development is not included in this document. This plan provides procedures and standards to coordinate and monitor the AM-1 Technical Training and Certification.

The plan does not include AM-1 Spacecraft specific training. AM-1 Spacecraft specific training will be provided by the spacecraft manufacturer. It is expected that the first draft of the AM-1 Spacecraft training materials will be available for review by ECS in November 1997.

This plan describes the responsibilities and processes for preparing and executing FOT staff training to operate the ECS FOS Release B system, to satisfactorily accomplish operations for the AM-1 mission. This Plan also provides management and employees with a reference document for technical training.

The training plan provides direction on gathering training requirements, assessing the needs of the training population, determining training sources, developing training courseware, delivering and evaluating the Training and Certification, and certifying designated personnel.

The program and the plan are used to coordinate and integrate training activities to increase the effectiveness and efficiency. It also provides information for management to use in evaluating the consistency and appropriateness of employee performance. Performance standards and procedures can be evaluated by comparing training performance with overall performance. For more detailed information see the FOS Release B Training and Certification Plan for the ECS Project (622-CD-003-001/626-CD-003-001).

3.3 Exercises and Simulations

Exercises and simulations will provide an interactive training environment for operations, i.e., the exercising of nominal and contingency procedures in as realistic an environment as possible. These simulations will exercise operator knowledge and skill in spacecraft operations, as well as mission preparedness. Anomaly identification (and resolution process), spacecraft launch and early orbit operation (nominal and contingency), on-orbit check-out and evaluation, network and inter-center communication. While training is a by part of the Simulations and exercises they are also used to check out procedures, processes, hardware, and software

The exercises and simulations are divided into 3 categories:

- Ground Operations Exercises (GOEs)
- Spacecraft Operations Exercises (SOEs)
- Integrated Simulations(ISs)

The GOEs and SOEs are to train the FOT and other necessary participants on ground and spacecraft operations. They are also building blocks for the ISs. The ISs are full scale spacecraft simulations that will follow planned mission activities and primarily focus on timelined events, and will include the FOT and all required ground system and spacecraft participants. For more information see the EOS Spacecraft Simulation Plan.

3.3.1 Master Schedule

The AM-1 Simulation Precedents Diagram is a graphical representation showing the titles, dates, precedences, and interdependencies of the GOEs, SOEs, and ISs. It is used as a master schedule when scheduling activities relating to the exercises and simulations.

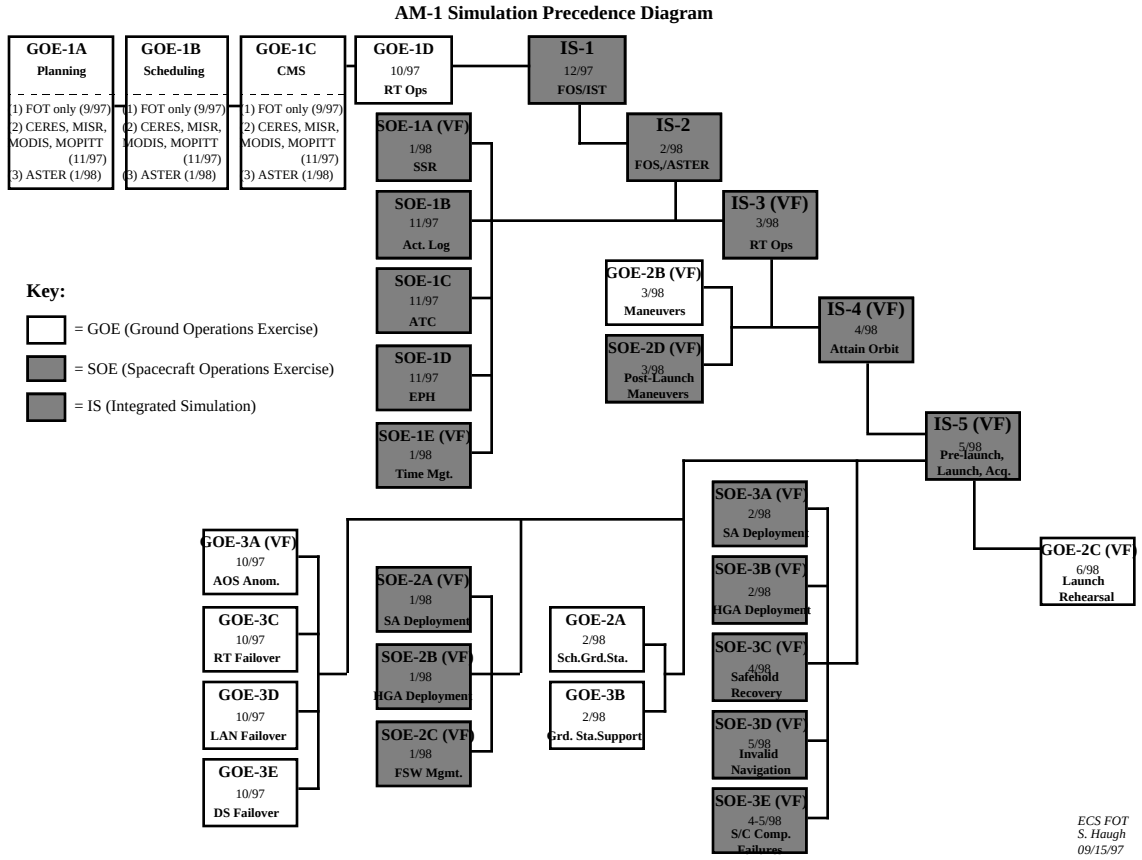

Figure 3.2. AM-1 Simulation Precedence Diagram

3.3.2 Ground Operations Exercises

The GOEs will concentrate on (but are not limited to) pre-launch, launch and acquisition activities. The GOEs will train the Flight Operations Team (FOT) and other necessary participants on how to implement nominal ground operation procedures, as well as exercise contingency procedures. The GOEs are divided into three types, normal operations, special operations, and contingency operations. GOE normal operations exercises will include the planning and scheduling of operations, as well as exercising the Command Management System (CMS) and uplinking real-time operations loads. The FOT will use Planning and Scheduling (PAS) and CMS software tools for the generation of the ATC loads for the AM-1 spacecraft. GOE special operations will include scheduling ground stations, maneuvers and launch rehearsal exercises. GOE contingency operations will include: AOS anomalies, ground station supports and failovers with the Real-time server, LAN and Data Server. For more information see the EOS Spacecraft Simulation Plan.

Table 3-1. GOE Activities

Title	Activity Simulated	Date	Participants
GOE-1A	Planning (3)	(9/97) (11/97) (1/98)	(1,10) (1,4,10) (1,8,10)
GOE-1B	Scheduling (3)	(9/97) (11/97) (1/98)	(1,10) (1,4,10) (1,8,10)
GOE-1C	Command(3) Management	(9/97) (11/97) (1/98)	(1,10) (1,4,10) (1,8,10)
GOE-1D	Normal R/T Ops	10/97	1, 6
GOE-2A	Schedule Ground Station	2/98	1, 7, 10
GOE-2B	Maneuvers	3/98	1, 4, 6, 8, 9, 10, 14
GOE-2C	Launch Rehearsal	6/98	All
GOE-3A	AOS Blind, Late, Negative	10/97	1, 6, 14
GOE-3B	Ground Station Support	2/98	1, 6, 2, 7
GOE-3C	RT Server Failover	10/97	1
GOE-3D	LAN Failover	10/97	1
GOE-3E	DS Failover	10/97	1

Participants column is: 1 = FOT, 2=EBnet, 3=RF SOC, 4=IOTs, 5=TGT, 6=EDOS, 7=WOTS/EPGS, 8=ASTER ICC & JPL Gateway, 9=NCC, 10=FDD, 11=DAAC(s), 12 = GSIF, 13 = SDVF, 14=VF

3.3.3 Spacecraft Operations Exercises

The SOEs will concentrate on (but are not limited to) pre-launch, launch and acquisition activities. The SOEs will train the Flight Operations Team (FOT) and other necessary participants on how to implement nominal spacecraft operation procedures, as well as exercise contingency procedures. The SOEs are divided into three types, normal operations, special operations, and contingency operations. Normal operations will include Solid State Recorder (SSR) management, dump of the activity log, the loading and dumping of the Absolute Time Command (ATC) and ephemeris, as well as exercising time correlation. These exercises are intended to train the FOT on how to accomplish day-to-day EOS operations. SOE special operations will include: solar array and High Gain Antenna (HGA) deployment, flight software patches and post-launch maneuvers. SOE contingency operations will include: solar array and HGA failures, safehold recovery and invalid navigation practices. For more information see the EOS Spacecraft Simulation Plan.

Table 3-2. SOE Activities

Title	Activity Simulated	Date	Participants
SOE-1A	SSR Management	1/98	1, 6, 14
SOE-1B	Dump Activity Log	11/97	1, 6
SOE-1C	Load/CRC and Dump/Compare ATC	11/97	1, 6
SOE-1D	Load/CRC and Dump/Compare EPH	11/97	1, 6
SOE-1E	Time Correlation Management	1/98	1, 6, 14
SOE-2A	Solar Array Deployment	1/98	1, 6, 14
SOE-2B	HGA Deployment	1/98	1, 6, 14
SOE-2C	FSW MNGT (SCC, CTIU, SSST)	1/98	1, 6, 13, 14
SOE-2D	Post-Launch Maneuvers	3/98	1, 6, 10, 14
SOE-3A	Solar Array Deployment	2/98	1, 6, 14
SOE-3B	HGA Deployment	2/98	1, 6, 14
SOE-3C	Safehold Recovery (ACE)	4/98	1, 4, 6, 8, 14
SOE-3D	Invalid Navigation	5/98	1, 6, 10, 14
SOE-3E	S/C Component Failures	4/98-5/98	1,4,6,8, 14

Participants column is: 1 = FOT, 2=EBnet, 3=RF SOC, 4=IOTs, 5=TGT, 6=EDOS, 7=WOTS/EPGS, 8=ASTER ICC & JPL Gateway, 9=NCC, 10=FDD, 11=DAAC(s), 12 = GSIF, 13 = SDVF, 14=VF

3.3.4 Integrated Simulations

Integrated Simulations are full scale exercises built from the GOEs and SOEs. The ISs will practice the procedural implementation of all control center entities and exercise the coordination between these facilities. There will be five ISs performed. IS-1 FOS-IST Normal Operations Interactions will focus on FOS-IST planning and scheduling, as well as exercising products for uplink command loads and tables for use by SSIM., IS-2 FOS-ASTER ICC Normal Operations Interactions will focus on FOS-ASTER planning and scheduling, as well as exercising products for uplink command loads and tables for use by SSIM. IS-3 Normal Real-Time Operations will include SSR management, dump of the activity log, the load of the ATC and ephemeris, as well as exercising time correlation. IS-4 Attain Mission Orbit will exercise orbit adjust procedures, trim maneuvers and Go/No-Go decisions for maneuvers. IS-5 Pre-launch/Launch/Acquisition will focus on launch configuration preparation and Go-for-launch activities that focus on spacecraft and instrument configuration prior to lift-off. For more information see the EOS Spacecraft Simulation Plan.

Table 3-3. IS Activities

Title	Activity Simulated	Date	Participants
IS-1	FOS-IST Interactions, Normal Operations	12/97	1, 2, 4, 6
IS-2	FOS-ASTER ICC Interaction, Normal Operations	2/98	1, 2, 6, 8
IS-3	Normal Real-time Operations	3/98	1, 2, 4, 6, 8,14
IS-4	Attain Mission Orbit	4/98	1, 6, 10,14
IS-5	Pre-launch, Launch, Acquisition	5/98	All

Participants column is: 1 = FOT, 2=EBnet, 3=RF SOC, 4=IOTs, 5=TGT, 6=EDOS, 7=WOTS/EPGS, 8=ASTER ICC & JPL Gateway, 9=NCC, 10=FDD, 11=DAAC(s), 12 = GSIF, 13 = SDVF, 14=VF

3.3.5 EOC Compatibility Tests

The purpose of the EOC Compatibility Tests are to establish compatibility between the AM1 spacecraft and the EOS Operations Center (EOC) before AM-1 launch. The AM-1 EOC Compatibility Test Series will consist of Three EOC Compatibility Tests (ECT-1, 2 and 3) and a final AM1 End-to-End Test. ECT1 and ECT2 have been completed successfully.

ECT-1 was the initial command and telemetry test with the spacecraft at the SCS in Valley Forge, Pa. The following objectives were established for ECT-1:

- Demonstrate that the Ebnet circuits can reliably support data communications between the SCS, EDOS, and the EOC.
- Demonstrate that EDOS can perform data capture and real-time packet processing of 16kbps housekeeping telemetry.
- Demonstrate that EDOS can perform forward link processing of command data at 2kbps.
- Demonstrate that the EOC can perform telemetry decommutation, limit checking, EU conversion and display for 16kbps housekeeping data from the AM-1 spacecraft.
- Demonstrate that the EOC can perform simple real-time commanding of the AM-1 spacecraft.

ECT-1 was conducted in January 1997, for more detail see the ECT-1 debrief report.

ECT-2 was the second of three ECTs. ECT-2 was conducted via the Space Network(SN) with the spacecraft at the Valley Forge I&T facility. ECT-2 built on ECT-1 and exercised a more complete set of ground system functions. The following objectives were established for ECT-1:

- Verify the the EOC can command the spacecraft at all rates via the Space Network, with command verification by CLCW and end-item telemetry verifier processing.
- Verify that the EOC can receive and process all telemetry rates through the SN.
- Verify that the EOC can receive and process solid state recorder dumps through the SN.
- Verify that the EOC can receive and process spacecraft memory dumps through the SN.

- Verify that the EOC can compute spacecraft clock correlation corrections from spacecraft telemetry and SN provided data.
- Miscellaneous FOS functions:
  - Reconfigure the command sub-system.
  - Output a command within 500ms of the user request.
  - Merge manual commands, load commands, and ground script commands.
  - Handle binary or hex format commands as critical commands.
  - Create dump images and reports.
  - Annotate telemetry quality based on EDOS EDU header flags.

ECT-1 was conducted in June 1997, for more detail see the ECT-2 debrief report.

ECT3 has been broken up into four smaller tests to fit better into the remaining spacecraft integration and ground system development schedules. These tests are:

(ECT “A” was deleted - objectives transferred to ECT “B” and “D”)

ECT “B” - S-Band Telemetry

Objectives:

- Verify the ability to dump the SSR HK buffer.
- Verify the ability to send Real time attitude telemetry all the way from the on-board sensors to the RTADS application on the FDS workstations via the FDS IST.
- Verify the ability to conduct SCC diagnostic dumps and dump processing - needs S/C and EOC - include dump by memory location.
- Verify the ability to support TONS by monitoring TONS data originating at the SCC at FDS work stations.
- Verify that FOS will exclude processing of duplicate CERES HK data.
- Verify that the AM1 and EOC are compatible at all rates and formats of S-band telemetry.
- Verify that the AM1 and the EOC are compatible on both the I and Q telemetry channels.

ECT-C - SSR Downlink and Downlink Processing

Objectives:

- Verify that science data originating from the SSR can be acquired at EDOS .
- Verify that EDOS and FOS can capture the LRS HK buffer data.
- Verify that EDOS can capture a dump of "full" Solid State Recorder with at least 261 seconds of ASTER data in the ASTER buffer and ASTER the quick-look flag set.

- Verify that EDOS and the FOS can capture the SSR Trash Buffer.
- Verify proper implementation of the SSR management algorithm and the compatibility of on-board and EDOS inputs for the algorithm

ECT-D - Commands and Loads

Objectives:

- Verify the ability to transmit real time commands to each remote terminal on the spacecraft (including each instrument).
- Verify the ability to transmit each of type of real time command to the spacecraft.
- Verify the ability to conduct FOP control and processing - Verify CLCW receipt and processing, re-synchronize next expected sequence numbers, set sliding window width, set timeout value, recover from lockout, set transmission limit.
- Verify the ability to patch the actual SCC FSW.
- Verify the ability to conduct a full SCC FSW load.
- Verify the ability to load each instrument micro-processor memory. Conduct full loads to verify on-board timing.
- Verify the ability to conduct SCC Data Table Loads including GNC table and absolute loads. Exercise each type of load termination mechanism (CTIU, FSW, and GNC). Include loads partitioned into 4k segments, and the FDS Star Catalog (partitioned load from an outside source)
- Verify the ability to command to both CTIU's.
- Verify the ability to load SSST memory and verify by memory dump
- Verify the ability to command the SCC Activity Log dump and receive the dump data at EDOS and the FOS.

ECT-E - Spacecraft Clock Correlation

Objectives:

- Verify the ability to conduct spacecraft clock correlation calculations by the RDD method.
- Verify the ability to conduct spacecraft clock correlation activities by the USCCS method.
- Verify the ability to reset the spacecraft clock from the EOC.
- Verify the ability to reset the spacecraft master oscillator frequency from the EOC.
- For the AM1 End-to-End test, the emphasis shifts from space-ground interface compatibility to flight systems operability. For a (**TBD** - 24 - 72 hours) period, a set of activities is scheduled by the FOS, with FDS support. The resulting uplinks are executed

and AM1 operations in response to the uplinked commands and data is monitored by the FOT as they would during normal operations. It is anticipated that the End-to-End test will include the following:

- S-Band Telemetry processing in all rates and formats.
- Real time commanding to each remote terminal (including instruments)
- SCC Loading and dumping, including ATCS and RTCS.
- SSR dump and dump processing.
- Ku Band telemetry processing in all rates and formats

3.4 ECS FOS Command and Telemetry Database Validation

3.4.1 Command Database Validation

The purpose of the Command Database Validation Plan is to:

1. Verify that the commands resident in the database at the EOC and transmitted to the spacecraft are received at Valley Forge (VF) as formatted by the EOC
2. Verify that the command received at Valley Forge is the command intended to have been sent by the EOC.
3. Verify that the Command Descriptor and Optional Command Data Words are formatted correctly.
4. Verify that the EOC will stop the transmission of those commands tagged as "hazardous" in the database

The Command Database Validation Plan is to have the EOC transmit every command resident with the EOC FOS database, to the Alternate Command Processor (ACP), at the LMMS VF I&T facility, where commands will be captured and interpreted based on the I&T Database Command File. In this process, as the EOC transmits a command, the EOC will also capture the command in two separate files, a "Mnemonic" file and a "Binary" file. Upon completion of transmission of commands from the EOC, copies of the mnemonic file will be exchanged between the EOC and the ACP at VF. The EOC mnemonic file will then be electronically compared to the ACP mnemonic file. A 100% compare between the two files will validate that the EOC database is identical to the original I&T database. Any non-compares will be investigated and the reason for the non-compare, resolved. The binary files will be used as a historical record of the test and will be a record of the entire CLTU sent from the EOC and received at the ACP and can be used in resolving non-comparisons on the mnemonic files. For more information see the EOC Command Validation Plan (Revision A).

3.4.2 Telemetry Database Validation

TBD

3.5 Standard Operation Procedures (SOP)

The Standard Operating Procedures (SOPs) provide the ECS Flight Operations Team (FOT) with a detailed set of instructions for the management and utilization of the configured items (CIs) associated with FOS. They also provides IST users with information unique to IST operations that is not covered in the FOS Operations Tools Manual. The number of SOPs will grow over time as more will be defined as AM-1 operations conditions dictates. For further information see FOT Standard Operations Procedures Document for the ECS project. The list of currently identified SOPs are:

- Configuration Management (CM)
- Project Database (PDB)
- Constraints
- Activity Definition
- Baseline Activity Profile (BAP)
- ECL Command Procedure
- Display Builder
- Relative Time Command Sequences (RTCS)
- Derived Parameters
- Algorithms
- Inhibit Identifiers Management
- Telemetry Monitor (TMON)
- Flight Software (FSW)
- Decision Support System (DSS)
- FOS Configuration Files
- Room Builder.

The Configuration Management (CM) Standard Operation Procedure (SOP) documents the Flight Operations Team (FOT) Operations CM Policy, CM Plan, and CM Processes, as well as the CM Implementation Procedures for AM-1 Mission Unique Operations Configured Items (CIs). Mission Unique CIs are essentially procedures, mission data and operation agreements. If there are any discrepancies between this document and the Configuration Management Plan for the ECS Project (102-CD-002-001), the latter takes precedence.

The Project Database (PDB) Standard Operating Procedure (SOP) documents the Flight Operations Team (FOT) PDB Plan and Processes, as well as the PDB Implementation Procedures. If there are any discrepancies between this SOP and the Data Format Control

Document (DFCD) for the Earth Observing System (EOS) Flight Operations Segment (FOS) Project Data Base Volumes I and II (505-10-35-1 and 505-10-35-2) , the latter takes precedence

The Constraints Standard Operation Procedure (SOP) documents the Flight Operations Team (FOT) Constraint Plan and Processes, as well as the Constraint Implementation Procedures. The Flight Operations Segment (FOS) and Instrument Support Toolkit (IST) Constraints will be defined in the Project Database (PDB).

The Activity Definition Standard Operating Procedure (SOP) documents the procedure for creating and/or modifying Activity Definitions to support both instrument and spacecraft operations. The SOP provides the user with a description of what Activity Definitions are, how they are created, approved, and incorporated into the Project Data Base (PDB). Although the details of the FOT Configuration Management (CM) process are covered in a CM-specific SOP, this Activity Definition SOP discusses aspects which are Activity-specific.

The Baseline Activity Profiles (BAP's) Standard Operating Procedure (SOP) documents the procedure for developing and configuring BAPs supporting both instrument and spacecraft operations. The SOP provides the user with a description of how BAP's are created, approved, modified and incorporated into the Planning and Scheduling (PAS) Operational Database.

The ECS Command Language (ECL) Standard Operating Procedure (SOP) documents the process for creating and validating ECL Command Procedures to support both instrument and spacecraft Real-time operations. The SOP provides the user with a description of the process for how ECL Command Procedures are created, validated, approved, and where they are used in Real-time operations. Although the details of the FOT Configuration Management (CM) process are covered in a CM-specific SOP, this ECL Command Procedure SOP will discuss aspects which are ECL Command Procedure-specific.

The Display Builder Standard Operating Procedure (SOP) documents the manner in which display pages are created, utilized and maintained in accordance with established CM procedures. The Flight Operations Team/Instrument Operations Teams (FOT/IOT) create display pages in order to display telemetry points, ground system global parameters and Space Network (SN) provided User Performance Data (UPD).

The Activity Definition Standard Operating Procedure (SOP) documents the procedure for creating and/or modifying Activity Definitions to support both instrument and spacecraft operations. The SOP provides the user with a description of what Activity Definitions are, how they are created, approved, and incorporated into the Project Data Base (PDB). Although the details of the FOT Configuration Management (CM) process are covered in a CM-specific SOP, this Activity Definition SOP discusses aspects which are Activity-specific.

The Baseline Activity Profiles (BAP's) Standard Operating Procedure (SOP) documents the procedure for developing and configuring BAPs supporting both instrument and spacecraft operations. The SOP provides the user with a description of how BAP's are created, approved, modified and incorporated into the Planning and Scheduling (PAS) Operational Database.

The ECS Command Language (ECL) Standard Operating Procedure (SOP) documents the process for creating and validating ECL Command Procedures to support both instrument and spacecraft Real-time operations. The SOP provides the user with a description of the process for

how ECL Command Procedures are created, validated, approved, and where they are used in Real-time operations. Although the details of the FOT Configuration Management (CM) process are covered in a CM-specific SOP, this ECL Command Procedure SOP will discuss aspects which are ECL Command Procedure-specific.

The Display Builder Standard Operating Procedure (SOP) documents the manner in which display pages are created, utilized and maintained in accordance with established CM procedures. The Flight Operations Team/Instrument Operations Teams (FOT/IOT) create display pages in order to display telemetry points, ground system global parameters and Space Network (SN) provided User Performance Data (UPD).

The Relative Time Command Sequence (RTCS) Standard Operating Procedure (SOP) documents the procedure for creating, testing, and uplinking a RTCS. The SOP describes the process to be followed for submitting the proposed RTCS, validating it, and finally uplinking and activating it. It will also describe the responsibilities of the parties involved in implementing RTCS changes

The Derived Parameter Standard Operations Procedure (SOP) documents the manner in which new or modified parameters are created, approved, and incorporated into the operational system in accordance with established FOT configuration management (CM) policies. Derived Parameters are used by both instrument (IOT) and spacecraft operations teams (FOT) to aid in realtime and post pass analysis of telemetry.

The Analysis Algorithm Standard Operations Procedure (SOP) documents the manner in which new or modified algorithms are created, approved, and incorporated into the operational system in accordance with established FOT configuration management (CM) policies. Analysis Algorithms are used by both instrument (IOT) and spacecraft operations teams (FOT) to aid in post pass analysis of telemetry.

The Inhibit ID Standard Operating Procedure (SOP) describes and documents the procedure for initiating, submitting and managing AM-1 spacecraft Inhibit IDs (INHIDs). Inhibit IDs are resident onboard the AM-1 spacecraft to provide a means for inhibiting/allowing ATCs, RTCSs, and TMONs as desired.

The Telemetry Monitor (TMON) Standard Operating Procedure (SOP) documents the procedure for creating, testing, and uplinking a TMON. The SOP describes the process to be followed for submitting the proposed TMON, validating it, and finally uplinking and activating it. It also describes the responsibilities of the parties involved in implementing TMON changes.

The Flight Software (FSW) Standard Operating Procedure (SOP) documents the procedure for patching the FSW. The SOP decribes the creation, testing, and uplink of a FSW Patch. It also describes the responsibilities of the parties involed in patching the Flight Software, namely the Flight Software Systems Branch (FSSB) and the Flight Operations Team (FOT).

The Decision Support System (DSS) Standard Operating Procedure (SOP) documents the process for creating and/or modifying a DSS rule or configuration. The SOP provides the user with a description of the DSS and it’s components. A description of the process to change the DSS configuration is included down to the code level. The Configuration Management (CM) aspect of this SOP is covered in an SOP dedicated strictly to CM issues.

The FOS (Flight Operations Segment) Configuration (Files) Definitions Standard Operating Procedure (SOP) is to familiarize the Flight Operations Team (FOT) members with the FOS configuration files definition and location of the files. The FOS Configuration files were created by the developers of FOS software and are utilized for the configuration of the FOS software at system startup.

The Room Builder Standard Operating Procedure (SOP) documents the Flight Operations Team process by which rooms are created, utilized and maintained in accordance with established Configuration Management (CM) procedures. The FOT/IOT can use the Room Builder to create and modify room definitions. Each room may contain one or more windows or tools, and such definable parameters as window size, position on screen, and window state (default or tiled) can be established and set under a given room name.

3.6 Release B COTS Hardware

The FOT Commercial Off the Shelf (COTS) Hardware for Release B document gives a detail list of the hardware and software associated with Release B. It details the EOC Floorplan, Hardware Diagram, Hardware Network Diagram, Cable Management Plan, Vendor Cost and Tracking System (VCATS) Listing, Documentation List, COTS Software, and Custom Software.

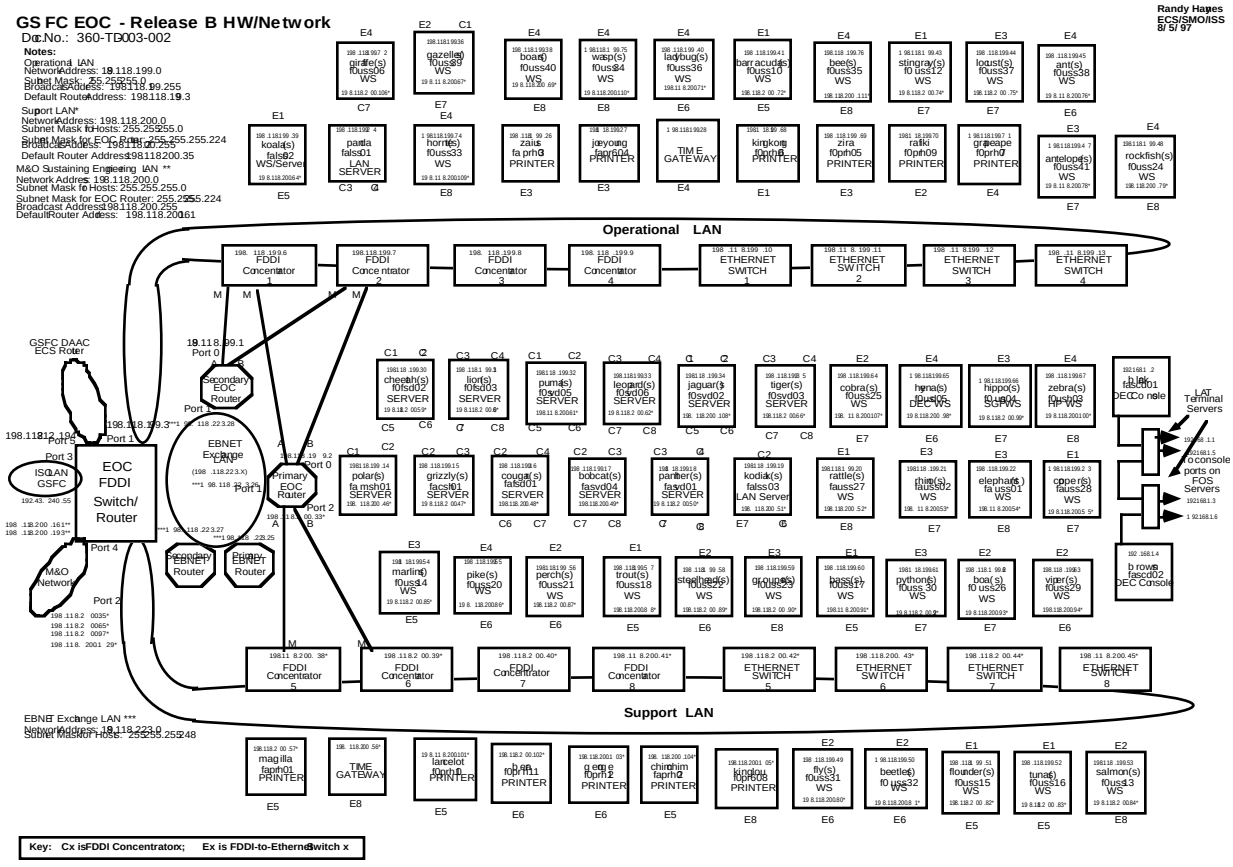

Figure 3.3. Hardware Network Diagram

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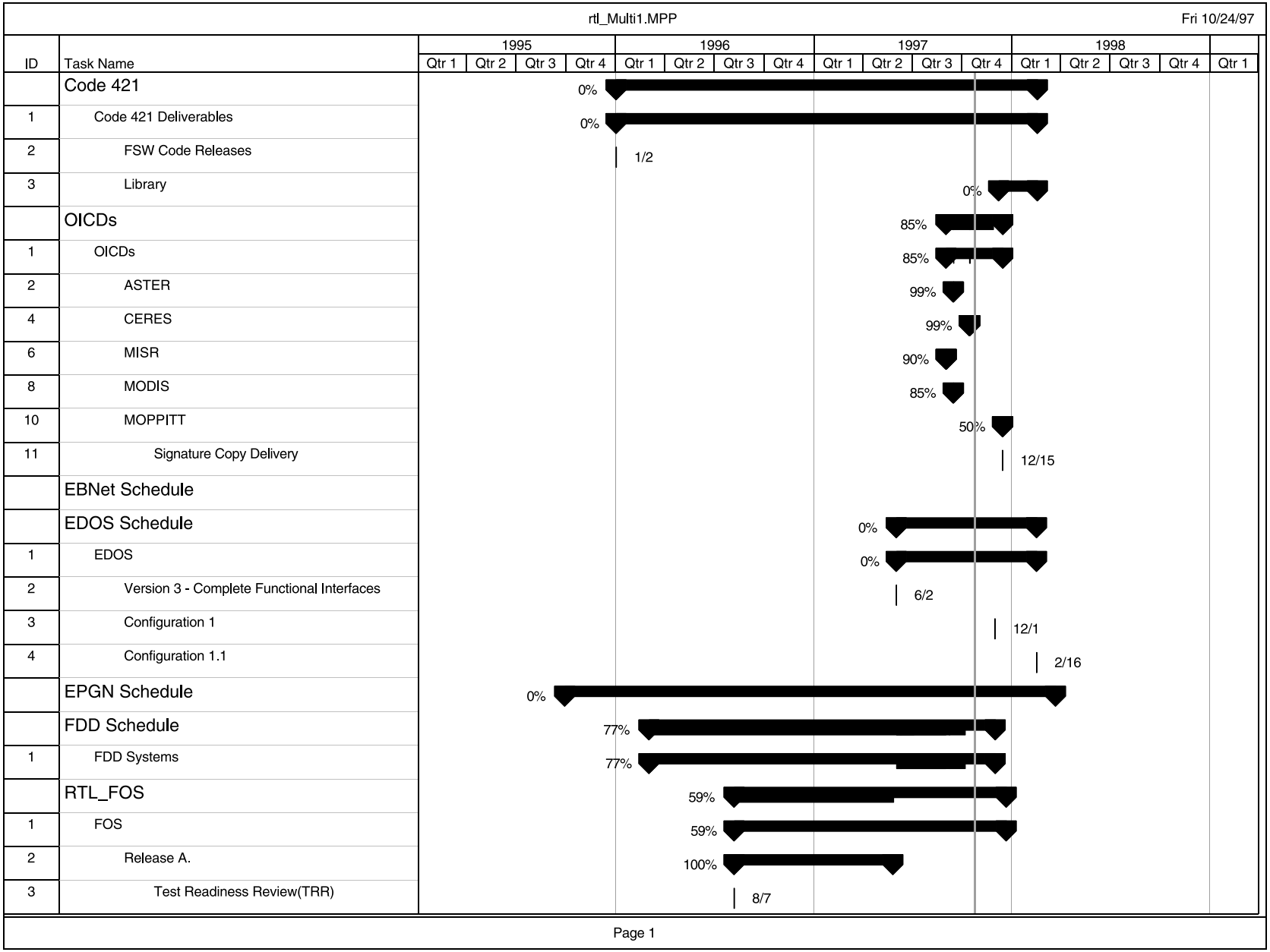
Attachment A

see next page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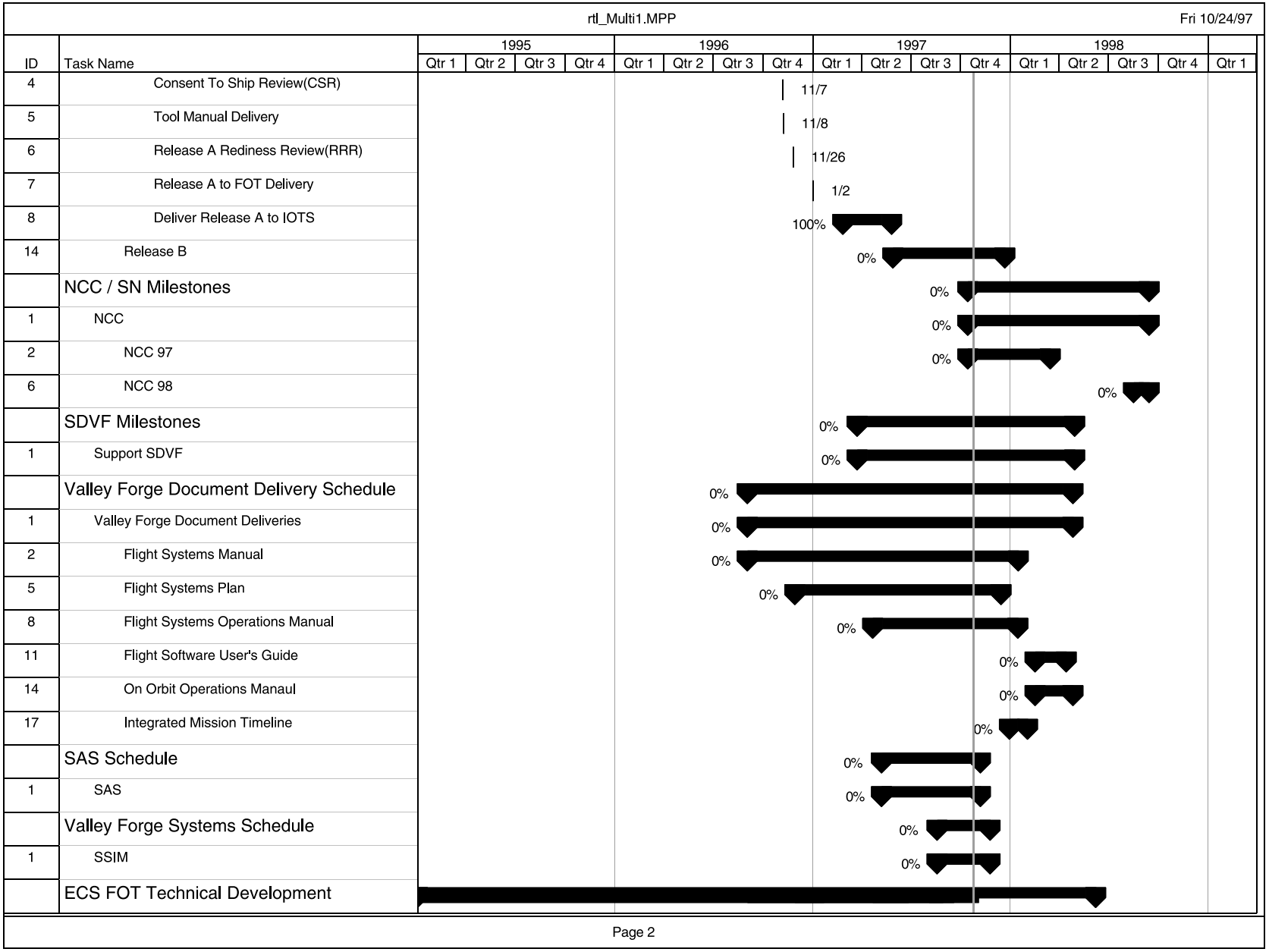
Fri 10/24/97
1995
1996
1997
1998
Qtr 1
Qtr 2
Qtr 3
Qtr 4
ID
Task Name
Code 421
1 Code 421 Deliverables
2 FSW Code Releases
3 Library
OICDs
1 OICDs
2 ASTER
4 CERES
6 MISR
8 MODIS
10 MOPPITT
11 Signature Copy Delivery
EBNet Schedule
EDOS Schedule
1 EDOS
2 Version 3 - Complete Functional Interfaces
3 Configuration 1
4 Configuration 1.1
EPGN Schedule
FDD Schedule
1 FDD Systems
RTL_FOS
1 FOS
2 Release A.
3 Test Readiness Review(TRR)
0%
0%
1/2
0%
85%
85%
99%
99%
90%
85%
50%
12/15
0%
0%
6/2
12/1
2/16
0%
77%
77%
59%
59%
100%
8/7
Page 1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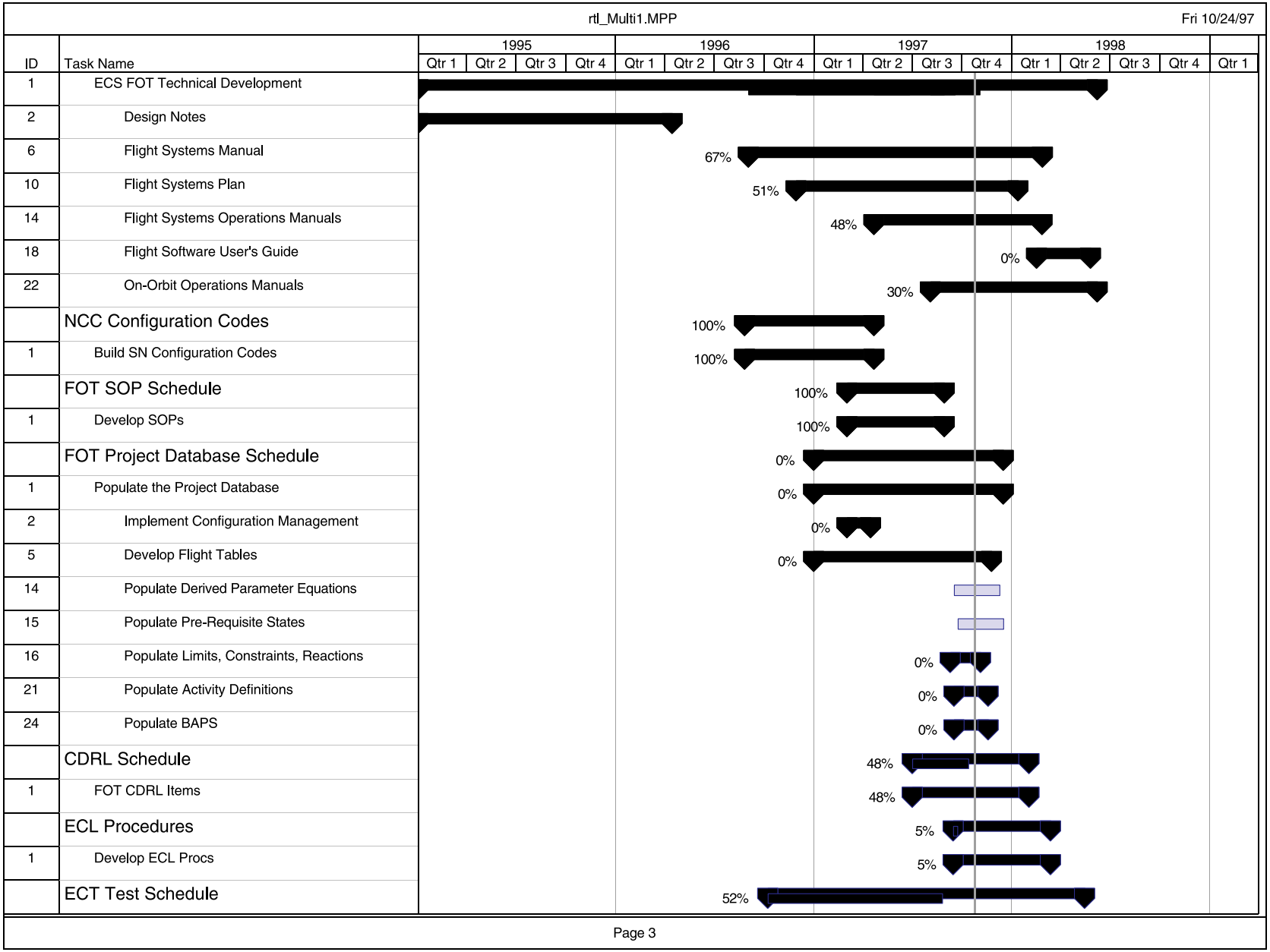
Fri 10/24/97
ID
Task Name
1995
1996
1997
1998
Qtr 1
Qtr 2
Qtr 3
Qtr 4
4 Consent To Ship Review(CSR) 11/7
5 Tool Manual Delivery 11/8
6 Release A Rediness Review(RRR) 11/26
7 Release A to FOT Delivery 1/2
8 Deliver Release A to IOTS 100%
14 Release B 0%
NCC / SN Milestones 0%
1 NCC 0%
2 NCC 97 0%
6 NCC 98 0%
SDVF Milestones 0%
1 Support SDVF 0%
Valley Forge Document Delivery Schedule 0%
1 Valley Forge Document Deliveries 0%
2 Flight Systems Manual 0%
5 Flight Systems Plan 0%
8 Flight Systems Operations Manual 0%
11 Flight Software User's Guide 0%
14 On Orbit Operations Manaul 0%
17 Integrated Mission Timeline 0%
SAS Schedule 0%
1 SAS 0%
Valley Forge Systems Schedule 0%
1 SSIM 0%
ECS FOT Technical Development

Page 2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1995
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Qtr 1 Qtr 2 Qtr 3 Qtr 4 Qtr 1 Qtr 2 Qtr 3 Qtr 4 Qtr 1 Qtr 2 Qtr 3 Qtr 4 Qtr 1 Qtr 2 Qtr 3 Qtr 4 Qtr 1
ID
Task Name
1 ECS FOT Technical Development
2 Design Notes
6 Flight Systems Manual
10 Flight Systems Plan
14 Flight Systems Operations Manuals
18 Flight Software User's Guide
22 On-Orbit Operations Manuals
NCC Configuration Codes
1 Build SN Configuration Codes
FOT SOP Schedule
1 Develop SOPs
FOT Project Database Schedule
1 Populate the Project Database
2 Implement Configuration Management
5 Develop Flight Tables
14 Populate Derived Parameter Equations
15 Populate Pre-Requisite States
16 Populate Limits, Constraints, Reactions
21 Populate Activity Definitions
24 Populate BAPS
CDRL Schedule
1 FOT CDRL Items
ECL Procedures
1 Develop ECL Procs
ECT Test Schedule
67%
51%
48%
0%
30%
100%
100%
100%
100%
0%
0%
0%
0%
0%
0%
0%
48%
48%
5%
5%
52%
Page 3

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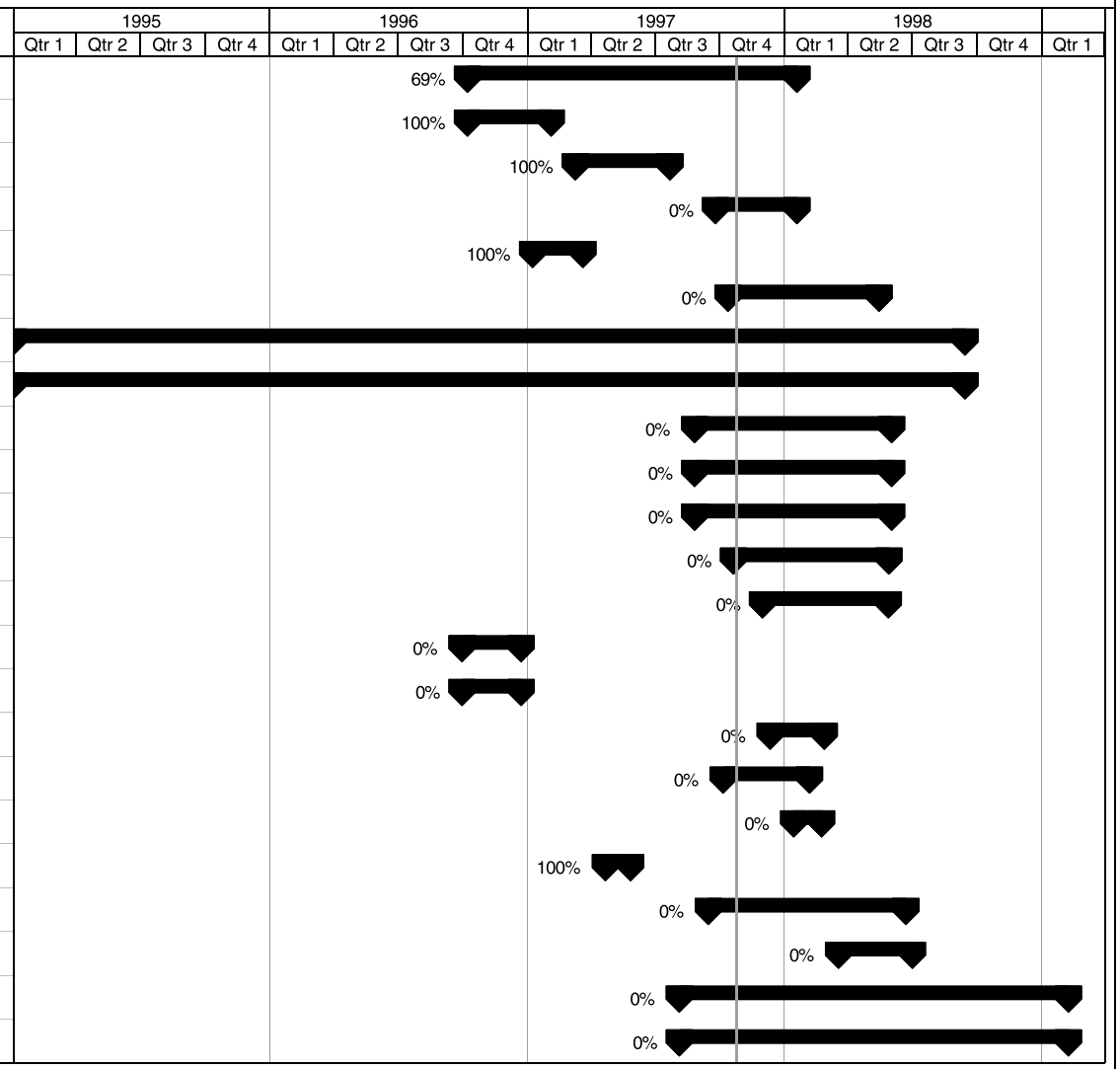
ID	Task Name
1	EOC Compatibility Tests
2	ECT-1
25	ECT-2
49	ECT-3
73	FOS GCMR / UPD Tests
77	Spacecraft Tests
	G. S.Interface Testing
1	Ground System Interface Tests
	AM-1 GOE / SOE Simulation Plan
1	Execute Simulations
2	Ground Operations Exercises (GOE-1)
46	Spacecraft Operations Exercises
111	Integrated Simulations
	DSS Development Schedule
1	Develop DSS
	FOT Analysis Tools Schedule
	FOT Training
	AM-1 Training
	Instrument Workshops
	Flight Operations Review Schedule
	AM-1 Launch Preparation
	AM-1 Launch Plus 90
1	Post Launch Verification



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